**Fermilab**
**ES&H Section**

INDUSTRIAL HYGIENE EQUIPMENT PROCEDURES

# GILIAN HIGH VOLUME AIR SAMPLING PUMP

10/92

## Objective

These procedures should be used when performing personal air monitoring. These procedures are to be used to ensure all necessary information is collected, the correct sampling procedure is used, and accurate data is obtained.

## Equipment

1. Calibrated Gilian sampling pump.

2. Sampling Media (Consult ES&H Section)

3. Hoses and clips for sampling pump

4. IH Sampling Form

5. Water Proof Pen.

## Procedure

1. Select the employee to be sampled. Make sure that the employee selected is representative of the operation under study. In some cases, it is wise to select the "worst case". If exposure is well below the exposure limits in the "worst case", then exposure will be well below the exposure limits under ordinary operating conditions.

   Explain the purpose of the sampling. Let the employee know that he/she will receive a copy of the results. Stress the importance of not removing or tampering with the sampling equipment. Instruct the employee to contact his/her supervisor if there is any problem.

2. Place the equipment on the employee. Attach the collection device to the shirt collar or as close as practical to the breathing zone. The inlet should face in a

downward position to avoid contamination. Position the excess tubing so as not to interfere with the work of the employee. Remove the sample cap.

3. Turn the pump on and record the starting time (use military time) on the IH sampling form.

4. Observe the pump operation after a few minutes to assure that it is working properly. Use this time to fill in information of the IH Sampling Notes form (name, ID#, etc.).

5. Check the pump about every two hours. More frequent checks may be necessary if there may be heavy filter loading. This is especially true for asbestos analysis (see notes for asbestos sampling). Ensure that the hose has not become pinched or detached. Note if the filter has been changed.

   Take detailed notes concerning work practices, possible interferences, different employee tasks and sources of exposure, use of local exhaust ventilation, and personal protective equipment used. Note any suggestions that can be used to reduce exposure.

6. Remove and stop the pump during lunch breaks. Note the times on the IH Sampling Notes Form. Recap the filter. Resume sampling after lunch.

7. A blank must be prepared for each type of sample collected. The ES&H Section will do this for you.

8. At the end of the sampling period, turn off the pump and record the ending time. Ask the employee if this was a typical day for the operation being sampled. If it was a very light day, the sampling may have to be repeated. Replace the sample cap.

9. Label the sample with the sample number with a water proof pen (see IH Notes Preparation Procedure).

10. Post calibrate the pump using the filter used for sampling. Average the before and after flow calibration results and record the average on the IH Sampling Notes form. Use this average to calculate sample air volume.

11. Calculate the total air volume for the collected sample and record this value on the IH Sampling Notes form (time in minutes x flow rate). Record the total amount of time the employee was exposed to the material if this value is different from the sampling period.

12. Submit the IH form and samples to the ES&H Section for analysis.

13. If necessary, decontaminate the equipment before returning it. Place pump on charge.

**Procedures for Total Dust and Welding Fumes**

1. For weight gain analysis (nuisance dust and welding fume), collect sample on a polyvinyl chloride filter (orange band) at a 2 liter per minute flow rate.

2. If both total weight and individual metals in the welding fume are to be analyzed, use a matched mixed cellulose ester (MCE) filter.

3. Change the filter if it appears over loaded. This usually means loose particulate on the filter.

4. When sampling for welding fumes, place the cassette inside the welding helmet.

**Procedures for Respirable Dust**

1. Use this procedure for mineral dusts.

2. Collect respirable dust samples with a clean cyclone equipped with a PVC filter. The flow rate should be 1.9 (+/- 0.2) liters per minute.

3. To attach the cyclone, remove the entire inlet section of the filter cassette (not just the caps). Press the cyclone firmly into the center ring of the cassette. Place the assembly into the cassette holder by inserting the cyclone through the large hole and clicking the cyclone's side pin into the slot in the cassette holder (see diagram). Stretch the spring loaded hold-plate over the cassette. Insert the adapter located in the end of the short piece of rubber tubing through the hole in the hold-down plate and into the cassette.

4. At the end of the sample period, separate the cyclone from the cassette and replace the cassette's inlet section. Remove the cyclone's red cap and clean out the contents.

5. Collect a bulk sample of the material sampled.

**Procedures for Metals**

1. Use a MCE (yellow band) filter.

**Procedures for Midget Impingers**

1. Calibrate the pump to 1 liter per minute.

2. Rinse the impinger with the reagent to be used in sampling. Add the specified amount of reagent (usually 10 ml in each) to two impingers. Place the impingers in the impinger holster.

3. Connect the impinger to the pump via a trap to prevent the reagent from entering the pump (See diagram).

4. When setting up the equipment, assure that the impinger will remain upright.

5. In some cases, it is necessary to add reagent during the sampling period when the reagent drops below one-half the original amount.

6. When sampling is completed, rinse the impinger stems with 1-2ml of reagent. Pour the contents into the NATLSCO supplied container.

**Procedures for Asbestos Sampling**

1. Asbestos sampling is performed per OSHA 1910.1001, Appendix B.

2. For most asbestos sampling we use phase contrast microscopy. In this method, fibers (as defined in the OSHA standard) collected on the filter are counted under a microscope. This method **does not** distinguish asbestos fibers form other types of fibers in the air. Be aware of this when sampling and note any possible fibrous interference (fiberglass, mineral wool, lint, etc.). In addition, high levels of dust will obscure fibers in the field of view of the microscopist and present serious analysis problems.

3. Use a 25-mm diameter mixed cellulose ester fiber filter cassette.

4. After positioning the sampler, remove the top cover of the cassette ("open face") and orient the cassette face down. Place the caps in a zip lock bag.

5. Periodically check the filter. It is important to not over load the filter. If the environment is dusty or the fiber level appears high, change the filters. This may mean changing filters every 15 minutes in very dusty environments. Note on the IH sampling notes form the time the filters were changed.

6. Provide 2 field blanks.

**Procedures for Gas/Vapor Sampling**

1. Gilian pumps can be used to sample for gases and vapors. Charcoal or silica gel tubes are most often used. Consult the ES&H Section for more information.